IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF TEXAS
WACO DIVISION

AMERICAN PATENTS LLC, Plaintiff, v. XEROX CORPORATION and DAHILL OFFICE TECHNOLOGY CORPORATION D/B/A XEROX BUSINESS SOLUTIONS SOUTHWEST, Defendants.	CIVIL ACTION NO. 6:21-cv-638-ADA

DEFENDANTS' OPENING CLAIM CONSTRUCTION BRIEF

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TABLE OF EXHIBITS

Exhibit #	DESCRIPTION
D1	U.S. Patent No. 6,847,803 ("'803 Patent")
D2	U.S. Patent No. 7,088,782 ("'782 Patent")
D3	U.S. Patent No. 7,310,304 ("'304 Patent")
D4	U.S. Patent No. 7,706,458 ("'458 Patent")
D5	'803 Patent – Original Application (Application No. 09/513,665)
D6	'803 Patent – Response to First Office Action (Application No. 09/513,665)
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D8	Paulraj, A., et al., "Introduction to Space-Time Wireless Communications" (Chapter 1), Cambridge University Press (2003)
D9	American Heritage College Dictionary, 4th Ed. (2002)
D10	The New Oxford American Dictionary
D11	Expert Declaration Of James A. Proctor, Jr. In Support Of Xerox Defendants' Opening Claim Construction Brief ("Proctor Decl.")

Defendants Xerox Corporation and Dahill Office Technology Corporation d/b/a Xerox Business Solutions Southwest (collectively, "Xerox") submit this opening claim construction brief in support of their proposed constructions of the four patents asserted by Plaintiff American Patents LLC ("AP").

I. INTRODUCTION

This case involves four patents and over fifty asserted claims concerning techniques for reducing interference and for synchronization in communication networks. Because of the highly technical nature of some claim terms (*e.g.*, "multi-input, multi-output (MIMO) system" and frequency/time synchronization), Xerox has proposed constructions that articulate the plain and ordinary meaning of those terms so that the jury can apply those claim terms to the accused technology. Simply instructing the jury to apply the "plain and ordinary" meaning for those terms as argued by AP will not be sufficient to enable the jury to determine the issues of infringement and validity.

Next, while AP refuses to offer a proposed construction for those highly technical terms, AP curiously insists that the non-technical claim term "when ***no*** information is being received"[1] requires a construction that differs from its plain and ordinary meaning. Motivated to improve its flawed infringement case and despite the fact that the claims expressly require that "***no*** information is being received" during a particular step, AP proposes that the term instead be construed to mean that the particular step can occur when ***some*** information is being received as long as that information is not "payload signal[s]." Xerox disagrees since (i) no construction is necessary for this readily understood claim term, and (ii) there is no support for AP's tortured interpretation of the claim.

[1] Unless otherwise noted, all emphasis is added.

Finally, Xerox has identified three claim terms ("coarse" and "fine" time synchronization, and "resemble") that are subjective terms of degree, which are indefinite since they do not provide objective boundaries for a person of ordinary skill in the art to know the scope of the claims with reasonable certainty. Since the specifications of the patents fail to provide any guidance on whether an accused time synchronization can be considered "coarse" or "fine," or whether a particular mathematical concept (*i.e.*, a "signal transmission matrix") "resembles" another mathematical concept (*i.e.*, a "space-time block code") as required by the claims, the scope of those claims is hopelessly ambiguous. And rather than try to confront or even clarify that ambiguity, AP merely proposes that the terms either be given their unidentified "plain and ordinary meaning," or be defined by simply substituting words that provide even less clarity regarding claim scope.

For all of these reasons, Xerox respectfully requests that its proposed constructions for these handful of terms be adopted by the Court.

II. THE DISPUTED CLAIM TERMS

A. U.S. Patent No. 6,847,803 B1

1. *"information"/"when no information is being received" (Claim 1)*

Claim Term	Xerox	AP
"information"/ "when no information is being received"	No construction necessary.	"payload signal(s)"/ "when no payload signal(s) is/are being received"

Claim 1 of the '803 Patent (Ex. D1) is directed to:

> A method for reducing interference in a receiver for receiving ***information*** in receiving time slots … characterized in that … at moments of time other than in said receiving time slot, ***when no information is being received***, a reference signal representing interference in said other time slot is formed and used for the tuning of the receiver in said receiving time slots." ('803 Patent 8:52-61.)

Based on this express claim language, in order to infringe, along with meeting the other

claim limitations, an accused method must form a "reference signal" when each of two very specific temporal limitations are met: (i) "at moments of time other than in [the] receiving time slot," and (ii) "when no information is being received." The parties' dispute concerns the latter claim limitation (*i.e.*, "when no information is being received"), which, as will be explained, was added by amendment during prosecution to try to overcome the prior art.

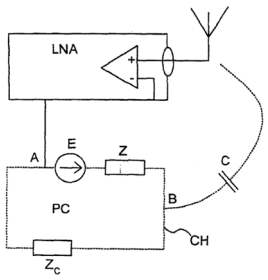
Xerox's position is that the express language of the claim limitation is clear on its face and needs no construction (*i.e.*, the reference signal must be formed "when ***no*** information is being received" by the receiver). So if a reference signal is formed in an accused method when ***some*** information is being received by the receiver, there can be no infringement.

Seeking a significantly broader[2] claim scope for infringement, AP proposes to rewrite the express claim language by replacing the term "information" with the term "payload signal(s)" – a term never mentioned in the claim or even the written description – such that an accused method can infringe as long as the reference signal is formed "when no ***[payload signal(s)]*** is being received" by the receiver." In other words, according to AP, even though the express claim language requires that the reference signal be formed "when ***no*** information is being received," the claim would still cover an accused method that formed a reference signal "when ***some*** information is being received" as long as that received information was not a "payload signal(s)." Not only is AP's proposed construction at odds with the express claim language and the plain and ordinary meaning of "information," it is contradicted by the intrinsic and extrinsic evidence.

[2] Ironically, since the claim language in dispute is a negative claim limitation (*i.e.*, "when ***no*** information is being received"), by proposing to replace the broad term "information" with the much narrower term "payload signal(s)," AP is advocating for a broader claim scope. For example, under AP's proposed construction, the claimed reference signal could be formed under many more circumstances when ***some*** information was received as opposed to the only one circumstance identified in the claim (*i.e.*, "when ***no*** information is being received").

Turning to the written description of the ’803 Patent, the introduction explains that “[i]n addition to ***actual information*** transmitted, a receiver is subjected to various ***interference signals*** which may affect the receiving capacity of the receiver.” (’803 Patent 1:19-21.) The ’803 Patent then repeatedly compares and contrasts (i) desirable ***“actual” or “useful” information***/signals as opposed to (ii) undesirable ***interference*** signals. Notably, the ’803 Patent broadly describes the transmission and receipt of desirable “actual” or “useful” information/signals rather than more narrowly identifying “payload signal(s),” ***which are never mentioned in the written description***.

For example, Fig. 1a (shown below) introduces the problem posed by interference signals, illustrating “how ***interference*** is coupled from a data processor PC to the receiver” and is “passed to the antenna of the receiver,” where ***the interference is “represented with a capacitor C***.” (’803 Patent 2:9-34; Fig. 1a.)

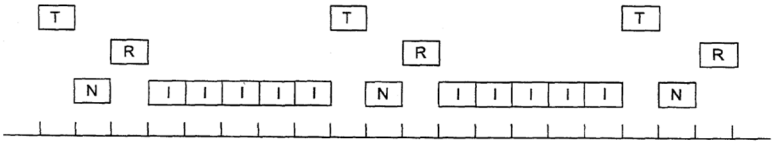


“[T]he ***interference signals*** coupled via the receiving antenna to the receiver are amplified in this low noise amplifier LNA, wherein ***the actual useful signal*** and the ***interference signal*** can no longer be separated from each other at further receiving stages.” (’803 Patent 2:41-46.) Attenuating interference in a receiver “is complicated by the fact that … it is difficult to separate the ***interference signal*** from ***the useful signal***.” (’803 Patent 2:61-65.)

Trying to address this problem, the ’803 Patent proposes a solution for reducing interference in the receiver by forming a reference signal and making an adjustment “during a time slot when ***no actual useful information*** is received in the receiver” so that the only signals present

when making the adjustment are the interference signals. ('803 Patent 3:16-18.) The "reference signal is formed … for the [t]uning of the receiver." ('803 Patent 3:21-25.) Since "the adjustment is performed when there is ***no actual useful information*** to be received … ***useful information*** does not affect the adjustment." ('803 Patent 3:51-55.)

To illustrate this concept, Figure 2 (shown below) illustrates that "the transmission and reception between a wireless communication device and a base transceiver station takes place in different time slots," with transmitting time slots (T), receiving time slots (R), idle time slots (I), and idle time slots to be used to attenuate interference (N). ('803 Patent 4:24-28, 4:46-49, Fig. 2.)



In a "transmission from the base station BTS to the wireless communication device MS, the processor MCU controls the receiver RX to receive a ***desired useful signal*** in a receiving time slot R." ('803 Patent 6:57-60, Figs. 2-4.) When an interference signal is received in the idle time slot (N), "the processor MCU gives the digital signal processing unit information that the received signal is ***not a useful signal but a[n] interference signal***, on the basis of which the attenuation of interference is to be adjusted." ('803 Patent 7:10-14, Figs. 2-4.) "Because the signal received in the idle slots I, N is ***not a useful signal***, it can be assumed that all the signals received are ***interference signals*** whose intensity in the receiver can thus be minimized." ('803 Patent 8:16-19.) Thus, the patented technique is predicated on the notion that the idle slots include only interference and not information, allowing formation of a reference signal that represents the interference only. Consistent with this written description, claim 1 of the '803 Patent expressly states and should be construed to require a method that forms a reference signal "when no ***information*** is being received" (*e.g.*, when only interference signals are being received). Contrary

to AP's position, the claim does not state and should not be rewritten to state "when no ***[payload signal(s)]*** is being received."

Furthermore, additional intrinsic evidence confirms that, if the patentee wanted to broaden the claim to merely require that the reference signal be formed "when no ***[payload signal(s)]*** is being received" or "when no ***payload information*** is being received," they could have but consciously chose not to. For example, while the Abstract of the Invention refers to "***payload*** information" ('803 Patent Abstract), which was added by amendment during prosecution (Ex. D6 AP0059549-50, AP0059554-55) and is the only time the term "payload" is used in the '803 Patent, the claims were drafted more generally to refer to "information." Similarly, in a response during prosecution after original claim 1 (Ex. D5 AP059469) had been rejected twice over prior art, the patentee amended the claim to narrowly require forming of the reference signal "when no information is being received" (Ex. D7 at AP0059566), and did ***not*** amend the claim to recite "when no ***payload signal*** is being received" or "when no ***payload information*** is being received."

This omission of the term "payload" in the amendment of the claims is significant and apparently intentional since the patentee distinguished the particular prior art reference's alleged disclosure that the "interference signal and attenuation is performed while the payload signal is being received." (Ex. D7 at AP0059570)(emphasis in original). Immediately after making that distinction based on the prior art reference's alleged disclosure of "payload signals," the patentee clarified that "***in accordance with the claims, as amended, it is not signals in general*** that are received but interference signals and that such signals are used to attenuate noise in the received time slot." (Ex. D7 at AP0059571.) In other words, the patentee chose to amend the claims to prohibit receipt of all "signals in general" rather than only prohibiting the receipt of certain signals (*i.e.*, "payload signals") as AP now argues. And the patentee touted the benefit of prohibiting all

signals when forming the reference signal, explaining that "[t]he attenuation is therefore based more directly on ambient noise, since ***no information signal*** is being received." (Ex. D7 AP059569.)

Consistent with this intrinsic evidence, Xerox's technical expert, James Proctor, confirms that a person or ordinary skill in the art at the time of the invention of the '803 Patent (1999/2000) ("POSITA")[3] after reviewing the intrinsic evidence would understand that the claimed reference signal must be formed "when ***no*** information is being received" by the receiver, and cannot be formed "when ***some*** information is being received" as long as that received information was not a "payload signal(s)." (Ex. D11 (Proctor Decl.) ¶¶ 23-29.) According to Proctor, a POSITA would understand that the "useful" signals or information described throughout the '803 Patent, as opposed to interference signals, could include many different types of "useful" information and signals other than payload signals (*e.g.*, control information, timing information, destination information, etc.) that would be received by a receiver during a receiving time slot. (Proctor Decl. ¶ 30.) In fact, the '803 Patent identifies examples of such information and signals as "data transmission and control signaling." ('803 Patent 8:42-47.)

In summary, since the intrinsic and extrinsic evidence confirms that the express claim language means exactly what it says (*i.e.*, the reference signal must be formed "when ***no*** information is being received" by the receiver), no construction is necessary and AP's improperly attempt to broaden the claim scope should be rejected.

[3] Proctor provides his opinion on the educational and professional experience of a POSITA, which includes at least a bachelor's degree in electrical engineering or a similar related field; and a number of years of industry experience in wireless communications networks and engineering. (Proctor Decl. ¶¶ 21-22.)

B. The Mody Patents.

AP has asserted ***over fifty claims*** across three related patents (U.S. Patent Nos. 7,088,782 ("'782 Patent" (Ex. D2)), 7,310,304 ("'304 Patent" (Ex. D3)), and 7,706,458 ("'458 Patent" (Ex. D4) (collectively, the "Mody Patents")), that share common inventors (Mody *et al*.) and, as their titles indicate, are directed to (i) "time and frequency synchronization" (ii) in "Multi-Input, Multi-Output (MIMO) systems."

As will be explained, out of the over fifty asserted claims, Xerox has only requested claim constructions for these two highly technical terms "to ensure that the jury fully understands … what the patentee covered by the claims" "so that the jury will be able to intelligently determine the questions presented." *Sulzer Textil A.G. v. Picanol N.V.*, 358 F.3d 1356, 1366 (Fed. Cir. 2004); *see also O2 Micro Int'l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1362 (Fed. Cir. 2008)("[C]laim construction is a matter of resolution of disputed meanings and ***technical scope***, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement."). In addition, Xerox has identified several claim terms that are indefinite under 35 U.S.C. § 112, ¶ 2, since those claim terms, when "read in light of the specification delineating the patent, and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 901 (2014).

1. *Claim Terms Requiring Construction.*

a. "Multi-Input, Multi-Output (MIMO) … system" ('782 Patent Claims 1 & 30, '304 Patent Claims 2 & 3, '458 Patent Claim 20)

Claim Term	Xerox	AP
"Multi-Input, Multi-Output (MIMO) … system"	plain and ordinary meaning which is "a system having a receiver with multiple inputs and a transmitter with multiple outputs, wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter"	plain and ordinary meaning

The preambles[4] of claims 1 and 30 of the '782 Patent and claim 20 of the '458 Patent all recite a "Multi-Input Multi-Output (MIMO)" "system." ('782 Patent 19:10-12, 22:32-34; '458 Patent 22:3-5.) Dependent claim 2 of the '304 Patent also recites a "Multi-input, Multi-Output (MIMO) system." ('304 Patent 18:27-29.)

The parties agree that the claimed "Multi-Input Multi-Output (MIMO) … system" should be accorded its "plain and ordinary meaning" (*i.e.*, the patentee did not act as its own lexicographer and there was no disavowal of claim scope in the specification or during prosecution). However, Xerox contends that, since a "MIMO" system is a highly technical term that would not be understood by a jury, the Court needs to articulate the plain and ordinary meaning of the term to provide a "workable definition of what [the] claim term[] mean[s]" so that a "juror [can] apply the claim terms to the accused technology to determine infringement." *Web Tracking Solutions, L.L.C. v. Google, Inc.*, 08-CV-03139, 2010 U.S. Dist. LEXIS 143519, at *13 (E.D.N.Y. July 27, 2010); *see also Digital Retail Apps, Inc. v. H-E-B*, Civil No. 6-19-CV-00167-ADA, 2020 U.S. Dist. LEXIS 11094, at *9, 2020 WL 376664 (W.D. Tex. Jan. 23, 2020)(acknowledging that claim constructions should be provided for "difficult technical terms for which a construction would help

[4] The parties agree that the preambles are limiting.

the jury understand the meaning of the term"). As will be explained, this plain and ordinary meaning of a "Multi-Input Multi-Output (MIMO) … system" based on the intrinsic evidence in each of the Mody Patents is simply "a system having a receiver with multiple inputs and a transmitter with multiple outputs, wherein the ***multiple inputs of the receiver receive signals from the multiple outputs of the transmitter***."

Xerox's proposed construction is supported by the Abstract of the three Mody Patents stating that "in a Multi-Input, Multi-Output (MIMO) system … ***the data is transmitted from any number of transmitting antennas and received by any number of receiving antennas***." ('782 Patent Abstract; '458 Patent Abstract, '304 Patent Abstract.) Significantly, each of the patents expressly distinguishes MIMO systems, "which use[] multiple transmitting antennas and multiple receiving antennas" from "Single-Input, Single-Output (SISO)" systems, "which utilize[] a single transmitting antenna to transmit radio frequency (RF) signals and a single receiving antenna to receive the RF signals." ('782 Patent 1:47-54, 7:42-45;'458 Patent 1:44-51, 7:32-35; '304 Patent 1:47-54, 7:39-42.)

The Background touts the advantages of using MIMO systems,[5] which were well known before the filing of the patents, with certain schemes (*e.g.*, OFDM), asserting that "[b]y using ***multiple transmitting antennas and multiple receiving antennas*** in OFDM systems, it is possible to increase the capacity of transmitted and received data while generally using the same amount of bandwidth as in a system with one transmit and one receive antenna." ('782 Patent 1:42-46; '458 Patent 1:39-43; '304 Patent 1:42-46.) The Summary of the Invention for all three patents further states that in the "MIMO … system of the present invention …. ***[a] number of transmitting***

[5] Each of the Mody Patents acknowledges that MIMO systems were well known, but claimed that "a need exists for a method and apparatus that is capable of providing time and frequency synchronization in MIMO systems." ('782 Patent 2:3-6; '458 Patent 1:67-2:2; '304 Patent 2:3-7.)

antennas corresponding to the number of modulators [***is/are] used to transmit the modulated signals*** over the channel. ***A number of receiving antennas [is/are] used to receive the transmitted signals***." ('782 Patent 2:26-35; '458 Patent 2:21-30; '304 Patent 2:26-35.)

FIG. 1 (shown below) in each of the Mody Patents is "an example embodiment of a Multi-Input, Multi-Output (MIMO) Orthogonal Frequency Division Multiplexing (OFDM) communication system 6 of the present invention is shown." ('782 Patent 3:35-38, FIG. 1; '458 Patent 3:30-33, FIG. 1; '304 Patent 3:31-34, FIG. 1.)

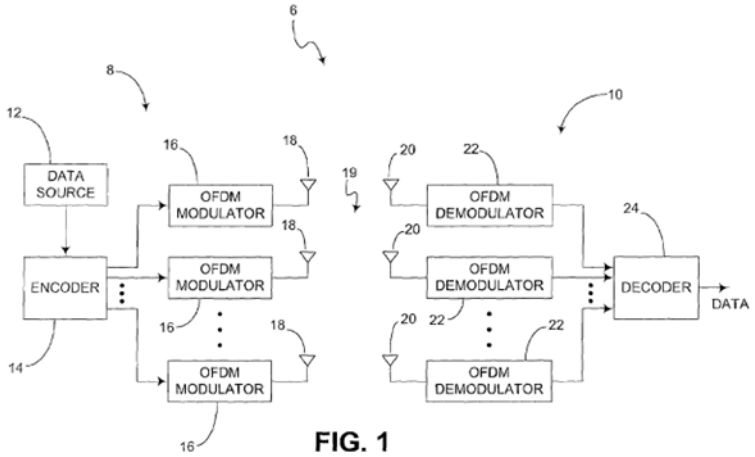
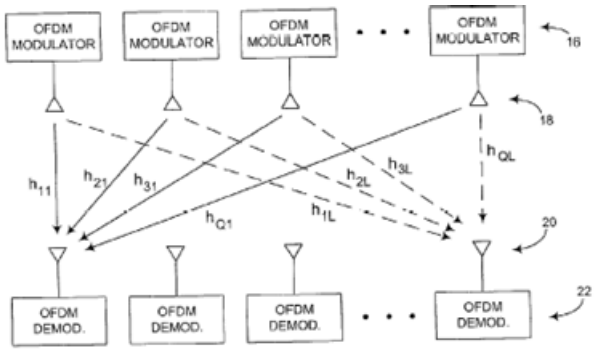


FIG. 1

As can clearly be seen in the MIMO system of FIG. 1, "***a transmitter 8 transmits signals across the wireless channel 19 and a receiver 10 receives the transmitted signals***." ('782 Patent 3:59-61, FIG. 1; '458 Patent 3:53-55, FIG. 1; '304 Patent 3:55-57, FIG. 1.) The transmitter 8 includes multiple output "transmitting antennas 18 [that] transmit the modulated frames over the channel 19, while the receiver 10 includes multiple input "receiving antennas 20 [that] receive[] the transmitted signals." ('782 Patent 4:20-35; '458 Patent 4:14-29; '304 Patent 4:16-31, FIG. 1.)

Complementing FIG. 1, "FIG. 5 shows a portion of the MIMO OFDM communication system 6 of FIG. 1 …." ('782 Patent 9:9-12, FIG. 5; '458 Patent 8:62-65, FIG. 5; '304 Patent 9:5-8, FIG. 5.)



As illustrated in FIG. 5, "each receiving antenna 20 [of the receiver 10] receives the signals transmitted from the Q transmitting antennas 18" of the transmitter 8. ('782 Patent 9:61-10:7, '458 Patent 9:46-59, '304 Patent 9:54-67.)

Xerox's proposed construction is also supported by, and consistent with, extrinsic evidence. For example, Xerox's technical expert (Proctor) confirms that a POSITA would understand in the 1999/2000 time frame after reviewing the intrinsic evidence that the claimed MIMO system would require "a receiver with multiple inputs and a transmitter with multiple outputs, wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter." (Proctor Decl. ¶¶ 31-40.) In support of his opinion, Proctor provides a textbook from the early 2000's that provided diagrams of SISO and MIMO systems, and explained that "MIMO (multiple input multiple output) has multiple (M_T) transmit antennas and multiple (M_R) receive antennas. (Proctor Decl. ¶ 40 (citing Ex. D8 at XEROX00011870-71).)

Accordingly, all of the intrinsic and extrinsic evidence confirms that the plain and ordinary meaning of a "Multi-Input Multi-Output (MIMO) … system" is simply "a system having a receiver with multiple inputs and a transmitter with multiple outputs, wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter."

b. synchronizing the received frame with the transmitted frame in the time domain and frequency domain ('782 Patent Claims 1 & 30; '458 Patent Claims 1 & 20)

Claim Term	Xerox	AP
"synchroniz[e/ing] the [received/demodulated] frame [to/with the transmitted frame] … in [a/both/the] time domain and frequency domain"	Time synchronization: plain and ordinary meaning, which is "estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame" Frequency synchronization: plain and ordinary meaning, which is "correcting for the difference between the transmitter frequency and the receiver frequency"	plain and ordinary meaning

Claim 1 of both the '782 and '458 Patents requires "a synchronization circuit [which/that] processes the received frame in order to synchronize ***the received frame*** in [a/both] ***time domain and frequency domain***" ('782 Patent 19:23-26; '458 Patent 18:63-66.) Method Claim 30 of the '782 Patent similarly requires the step of "synchronizing ***the received demodulated frame to the transmitted frame*** … in the ***time domain and frequency domain***." ('782 Patent 22;43-45.) Finally, method claim 20 of the '458 Patent requires the step of "synchronizing ***the [received] frame with the transmitted frame*** …in the ***time domain and frequency domain***." ('458 Patent 23:14-16.)

Accordingly, each claim requires synchronizing the received frame (*i.e.*, the frame received by the receiver) with the transmitted frame (*i.e.*, the frame transmitted by the transmitter) in both (i) the time domain and (ii) the frequency domain. As explained in the patents, "substantial synchronization in time as well as in frequency [is required] in order that transmitted signals can be recovered with adequate accuracy." ('782 Patent 12:21-25; '458 Patent 12:8-12.) Once again, Xerox contends that, since the time and frequency synchronization of received and transmitted frames in a MIMO system are highly technical terms that would not be understood by a jury to

allow them to determine infringement and invalidity, the Court should articulate the plain and ordinary meaning of the terms based on the intrinsic evidence.

Turning first to the construction of the claimed time synchronization of the received frame and transmitted frame, based on the intrinsic evidence, Xerox proposes that the term be construed as "estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame." Xerox's construction finds direct support in the specification's general and repeated description of time synchronization:

- A significant task of the receiver 10 is to ***estimate the time of arrival of the transmitted signal. This process is called "time synchronization."*** ('782 Patent 10:19-21; '458 Patent 10:4-6.)
- ***Time synchronization*** involves ***determining the*** best possible ***time for the start of the received frame to closely match the start of the transmitted signal***." ('782 Patent 12:25-28; '458 Patent 12:12-14.)
- [T[he fine ***time synchronization*** circuit 72 … calculates a ***more accurate start time of the received frame***. ('782 Patent 13:37-40, FIG. 8; '458 Patent 13:22-25.)
- The coarse ***time synchronization*** circuit 66 determines the ***approximate start time of each received block*** of N+G samples. ('782 Patent 14:1-3. FIG. 8; '458 Patent 13:52-54.)
- The fine ***time synchronization*** circuit 72 provides ***an optimal time instant of the start of the received OFDM frame***. ('782 Patent 17:62-64; '458 Patent 17:37-39.)

While Xerox expects that AP will argue that Xerox's proposed construction improperly reads limitations from the specification into the claim or limits the scope of the claim to the preferred embodiment, that is simply not true. Xerox's proposed construction for time synchronization ("estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame") does not limit the scope of the claim to any of the disclosed embodiments for estimating the arrival or start times of the frames, as confirmed by Xerox's technical expert. (Proctor Decl. ¶¶ 43-44.)

Turning next to the construction of the claimed frequency synchronization of the received

frame and transmitted frame based on the intrinsic evidence, Xerox proposes that the term be construed as "correcting for the difference between the transmitter frequency and the receiver frequency." Once again, Xerox's construction finds direct support in the specification's general and repeated description of frequency synchronization.

For example, immediately after the specification describes the "time synchronization" process, it states that "in addition to time synchronization, OFDM systems typically require ***frequency synchronization*** as well. Because there usually exists a certain ***difference between the*** local oscillator ***frequencies of the transmitter and the receiver*** … ***which should typically be corrected*** in order to avoid degradation in system performance." ('782 Patent 10:21-27; '458 Patent 10:6-12.) As the specification further explains,

> [A]ny ***difference in frequencies between the transmitter and the receiver*** local oscillators may cause a loss of sub-channel orthogonality. The ***synchronization circuit 61 corrects this*** loss of sub-channel orthogonality ***by finding an estimate of the difference between the frequencies of*** the local oscillators 46 of ***the transmitter 8 and the frequencies of*** the local oscillators 59 of ***the receiver 10***. The ***synchronization circuit 61 further corrects these frequency difference*** estimates." ('782 Patent 12:41-51, FIGs. 3 & 7; '458 Patent 12:27-36.)

The particular "correction" (or adjustment) for the frequency difference between the transmitter and the receiver for synchronization disclosed in the patents is "adjusting the frequency of the local oscillator 59 [of the receiver 10] to the frequency of the local oscillator 46 of the transmitter 8." ('782 Patent 13:29-32, 16:16-19, 16:52-59 ("the frequency offset correction circuit 74 further corrects the frequency difference to synchronize the frequency"), FIGS. 7, 8, 11; '458 Patent 13:14-17, 15:60-62, 16:28-35.)

Once again, while Xerox expects that AP will argue that Xerox's proposed construction improperly reads limitations from the specification into the claim or limits the scope of the claim to the preferred embodiment, that is simply not true. Xerox's proposed construction for frequency synchronization ("correcting for the difference between the transmitter frequency and the receiver

frequency") does not limit the scope of the claim to any of the disclosed embodiments for making such correction or determining the frequency difference, as confirmed by Xerox's technical expert. (Proctor Decl. ¶¶ 45-48.)

Accordingly, this Court should adopt Xerox's proposed constructions for synchronizing the received frame with the transmitted frame in the time domain and frequency domain.

2. *Indefinite Terms*

a. "coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]" ('782 Patent Claims 1, 6, 30, 38, 49; '482 Patent Claim 4.)

Claim Term	Xerox	AP
"coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]"	Indefinite (35 U.S.C. §112, ¶ 2)	plain and ordinary meaning

Several of the asserted apparatus claims require both "a ***coarse*** time synchronization circuit" and "a ***fine*** time synchronization circuit," while several of the asserted method claims require the separate steps of "***coarse*** time synchronizing" and "***fine*** time synchronizing." ('782 Patent Claims 5, 6, 30, 38, 49; '458 Patent Claim 4.)

As their dictionary definitions confirm, the ordinary, non-technical terms "coarse" and "fine" are ***subjective terms of degree***. For example, "fine" is understood to be "[o]f superior quality" and "[c]onsisting of very small particles; not coarse." (Ex. D9 at XEROX00010691.) On the other hand, "coarse" is understood to be "[o]f low, common, or inferior quality" and "[c]onsisting of large particles; not fine in texture." (Ex. D9 at XEROX001692.)

"[A] patent must be precise enough to afford clear notice of what is claimed, thereby appris[ing] the public of what is still open to them." *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898, 909 (2014). "Otherwise there would be a ***zone of uncertainty*** which enterprise and experimentation may enter only at the risk of infringement claims." *Id.* at 910. To avoid this

"zone of uncertainty," the Federal Circuit has stated that "claims, when read in light of the specification and the prosecution history, must provide ***objective boundaries*** for those of skill in the art." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1363 (Fed. Cir. 2018). When a term of degree is used in a claim, "the court must determine whether the patent provides ***some standard for measuring that degree***." *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015) (quotation marks omitted). Here, Xerox alleges that these "fine" and "coarse" time synchronization claim terms are indefinite and cannot be construed since neither the claims nor the specification "provide objective boundaries for those of skill in the art." *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014).

As shown in FIG. 8 (shown below) of the Mody Patents, the synchronization circuit 61 includes both a coarse time synchronization circuit 66 and a fine time synchronization circuit 72.

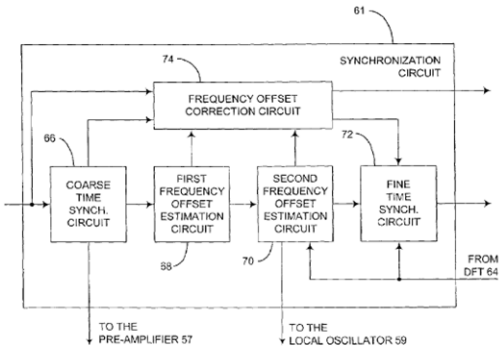


FIG. 8

Turning first to the "coarse" time synchronization, the specification indicates that the "coarse time synchronization circuit 66 ***determines the approximate start time*** of each received block of N+G samples by estimating the approximate starting time of the OFDM frame." ('782 Patent 12:56-59, 14:1-3, 15:25-27 ("the coarse time synchronization circuit 66 determines an ***approximate*** starting time"), FIG. 8; '458 Patent 12:41-44, 13:52-54, 15:4-6.) After determining this ***"approximate"*** start time, the "coarse time synchronization circuit 66 sends the ***coarsely synchronized signals*** to a first frequency offset estimation circuit 68." ('782 Patent 12:59-61,

15;32-36, FIG. 8; '458 Patent 12:44-46, 15:10-14).

The specification discloses that the "coarse time synchronization circuit 66 may comprise circuitry capable of performing a technique that is hereinafter referred to as 'auto-correlation.'" ('782 Patent 14:13-15, FIG. 9A; '458 Patent 13:62-64.) The specification then discloses that "[a]n example embodiment of an auto-correlation circuit 75 is shown in FIG. 9A" and describes the operation of that exemplary circuit. ('782 Patent 14:12-42, FIG. 9A; '458 Patent 14:4-23.) Finally, in concluding the description of this exemplary "auto-correlation" technique, the specification states that:

> The auto-correlation operation can be represented using the equation:
>
> $$\phi_n = \sum_{k=0}^{G-1} r^*_{n+k} \cdot r_{n+k+N_I}$$
>
> where the ***coarse time synchronization is achieved when ϕ_n attains a certain threshold value***." ('782 Patent 14:43-53; '458 Patent 14:23-32.)

Significantly, the ***specification does not provide any example values or even ranges of values of what "certain threshold value"*** would need to be exceeded be in order for the auto-correlation operation to "achieve" "coarse time synchronization." In other words, the specification does not provide any objective boundary for a POSITA to determine whether a particular time synchronization (i) was accurate enough to be considered a "coarse" time synchronization (*i.e.*, if ϕ_n "achieved" the unknown "threshold value"), or (ii) was not even accurate enough to be considered a "coarse" time synchronization (*i.e.*, if ϕ_n did not "achieve[]" the unknown "threshold value"). *See Power Integrations, Inc. v. On Semiconductor Corp.*, No. 16-cv-06371-BLF, 2018 U.S. Dist. LEXIS 184224, at *65 (N.D. Cal. Oct. 26, 2018)(holding that the claimed "moderate power level threshold" was indefinite since the "specification teaches that the moderate power

level threshold value falls somewhere within a wide range, but it does not provide specific guidance on where in that range the value falls").

Adding to the uncertainty, the specification states that "[a]fter the ***coarse time synchronization*** circuit 66 determines an ***approximate starting time***, a ***more precise time synchronization is achieved*** by utilizing the ***fine time synchronization*** circuit 72." ('782 Patent 15:25-31, FIG. 8; '458 Patent 15:4-9.) In other words, "the fine time synchronization circuit 72 [will] calculate[]s a ***more accurate*** start time of the received frame" than the "approximate starting time" provided by the coarse time synchronization circuit. ('782 Patent 13:37-40, '458 Patent 13:22-25.) Further confusion is caused by the specification's inclusion of yet another term of degree, stating that the "fine time synchronization circuit 72 provides an ***optimal*** time instant of the start of the received OFDM frame." ('782 Patent 17:62-64, 19:40-42 (Claim 4); '458 Patent 17:37-39.)

While "auto-correlation" was used for coarse time synchronization, the specification discloses that "[f]ine time synchronization can be performed by cross-correlating." ('782 Patent 17:4-8, FIG. 12; '458 Patent 16:47-51.) The specification then discloses that "an example embodiment of the fine time synchronization circuit 72" shown in FIG. 12 and describes the operation of that exemplary circuit. ('782 Patent 17:8-38, FIG. 12; '458 Patent 16:51-17:13.) Finally, in concluding the description of this exemplary "cross-correlating" technique, the specification states that:

> The N_I number of combined signals from the mixers 102 are input into a summing circuit 108, which sums the combined signals using equation:
>
> $$\psi_n = \sum_{k=0}^{N_I-1} s_k^* \cdot r_{n+k}.$$

> ***Fine time synchronization is achieved at a time instant n when the function ψ attains a value greater than a predetermined threshold***." ('782 Patent 17:38-49; '458 Patent 17:14-25.)

But once again, the ***specification does not provide any example values or even ranges of values of what "predetermined threshold"*** would need to be exceeded be in order for the cross-correlation operation to "achieve" "fine time synchronization." In other words, the specification does not provide any objective boundary for a POSITA to determine whether a particular time synchronization (i) was accurate enough to be considered a "fine" time synchronization (*i.e.*, if ψ_n exceeds the unknown "predetermined value"), or (ii) was not accurate enough to be considered a "fine" time synchronization (*i.e.*, if ϕ_n did not exceed the unknown "predetermined value").

Accordingly, the only embodiments disclosed in the Mody Patents for performing "coarse time synchronization" and "fine time synchronization" provide no "standard" or "objective boundary" for a POSITA[6] ***or the jury in this case*** to determine whether or not an accused time synchronization circuit is or is not covered by the claims (*i.e.*, whether the accused time synchronization circuit is coarse, fine, or neither). (Proctor Decl. ¶¶ 51-65.)

As explained by Xerox's technical expert, there are no universally accepted definitions of the terms "coarse time synchronization" and "fine time synchronization" for the claimed MIMO systems. (Proctor Decl. ¶ 61.) And since the specification does not provide any example values or even ranges of values of what the two different "certain threshold value" (for "coarse") and "predetermined threshold" (for "fine") were, a POSITA would be left to speculate and use his or her own judgment to determine and set threshold values to achieve levels of accuracy that the particular POSITA considered to be sufficient for "coarse" or "fine" synchronization. (Proctor

[6] *See Nautilus*, 572 U.S. at 908 ("[D]efiniteness is measured from the viewpoint of a person skilled in [the] art at the time the patent was filed.")

Decl. ¶ 61.) In addition, the claimed MIMO systems that are being synchronized are not limited to any particular communication system (*e.g.*, WiFi, LTE, CDMA, etc.) or application. Since each of those different communications systems and applications would have different requirements for the level of accuracy of time synchronization required, once again, a POSITA would be left to speculate and use his or her own judgment to determine and set threshold values to achieve levels of accuracy that the particular POSITA considered to be sufficient for "coarse" or "fine" synchronization. (Proctor Decl. ¶ 62); *see also U.S. Well Services, Inc. v. Halliburton Co.*, 6:21-CV-00367-ADA, Dkt. 74 at 10 (W.D. Tex. Jan. 17, 2022)(finding "high level pressure" indefinite "because what might be sufficiently 'high' pressure for one fracturing application and according to one POSITA may be not 'high' enough in another fracturing application and to another POSITA.") Since the scope of the claimed "coarse time synchronization" and "fine time synchronization" "depends on the unpredictable vagaries of any one person's opinion," those "term[s] of degree fail[] to provide sufficient notice of [their] scope." *Interval Licensing*, 766 F.3d at 1371.

Making matters worse, as with all rapidly advancing technology, what may have been subjectively considered "fine" time synchronization back in 2001/2002 when the Mody Patents were filed, would likely no longer be considered "fine."[7] (Proctor Decl. ¶ 63.) To illustrate the problem, assume that a POSITA in 2022, after reading the asserted claims of the Mody Patents (which require both a coarse synchronization circuit and a fine synchronization circuit) wanted to design an apparatus for synchronizing a MIMO system only included coarse time synchronization circuits in order to avoid infringement. (Proctor Decl. ¶ 64.) In other words, the POSITA was

[7] By way of analogy, a computer processor that was considered to be a "high speed" processor in 2001/2002 would certainly no longer be considered to be a "high speed" processor today.

willing to provide a product that had less accurate time synchronization in order to clearly avoid infringement. So if that POSITA implemented outdated time synchronization techniques that provided lower accuracy synchronization by today's standards, would the time synchronization be considered "fine" since twenty years ago when the Mody Patents were filed, one particular POSITA may have considered the now-outdated time synchronization technique "fine"? (Proctor Decl. ¶¶ 63-64.)

Since "the intrinsic and extrinsic evidence does not provide any 'objective baseline' to enable a POSITA to differentiate" between a coarse time synchronization circuit, a fine time synchronization circuit, or a time synchronization circuit that was neither coarse or fine, the claimed "coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]" claim terms are indefinite. *U.S. Well Services*, 6:21-CV-00367-ADA, Dkt. 74 at 12 (citing *Liberty Ammunition, Inc. v. United States*, 835 F.3d 1388, 1395 (Fed. Cir. 2016)("Terms of degree are problematic if their baseline is unclear to those of ordinary skill in the art.").)

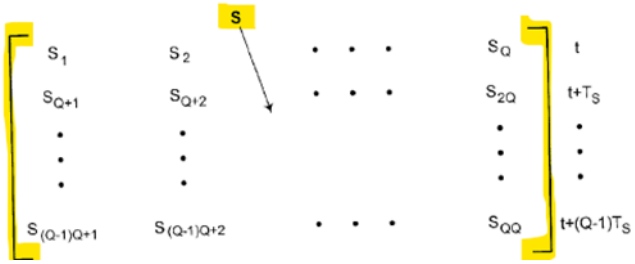
b. "signal transmission matrix resembl[es/ing] an existing space-time block code" ('782 Patent Claims 44 & 51; '304 Patent Claim 7)

Claim Term	Xerox	AP
"signal transmission matrix resembl[es/ing] an existing space-time block code"	Indefinite (35 U.S.C. §112, ¶ 2)	"signal transmission matrix has/having qualities or features in common with a pre-defined space-time block code."

Three of the asserted dependent claims require a "signal transmission matrix resembl[es/ing] an existing space-time block code." ('782 Patent Claims 44 & 51; '304 Patent Claim 7.) As the dictionary definition of "resemble" (*i.e.*, "have qualities or features, esp. those of appearance, in common with (someone or something); look or seem like; *some people resemble their dogs | they seemed to* ***resemble each other*** *closely*." (Ex. D10 at AP_CC_0000104) makes

clear, the term is another ***subjective term of degree***. For example, whether two individuals (*e.g.*, siblings, parents/children) "resemble" each other is a subjective determination. Here, the claims require that "a signal transmission matrix" be analyzed to determine whether it "resembles" "an existing space-time block code," rendering the claims indefinite since neither the claims nor the specification "provide objective boundaries for those of skill in the art" to make that determination. *Interval Licensing*, 766 F.3d at 1371.

Turning to the specification of the Mody Patents, FIG. 5 (annotated and shown below) illustrates what the patents refer to as a signal transmission matrix (S). ('782 Patent 9:9-60: '304 Patent 9:5-53.)

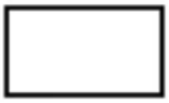
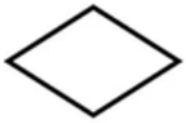


Notably, the specification never defines ***or even mentions*** "space-time block code," and never explains how a signal transmission matrix might "resemble" or otherwise compare to space-time block codes. (Proctor Decl. ¶¶ 69, 74.) But the specification does provide three examples of signal transmission matrices (shown below) that a POSITA would understand are space-time block codes. ('782 Patent 11:6-44; '304 Patent 10:65-11:36.)

$S_k = \begin{bmatrix} S_{1,k} & S_{1,k} \\ -S_{1,k}^* & S_{1,k}^* \end{bmatrix}$	$S_k = \begin{bmatrix} S_{1,k} & S_{1,k} & S_{1,k} & S_{1,k} \\ -S_{1,k} & S_{1,k} & -S_{1,k} & S_{1,k} \\ -S_{1,k} & S_{1,k} & S_{1,k} & -S_{1,k} \\ -S_{1,k} & -S_{1,k} & S_{1,k} & S_{1,k} \end{bmatrix}$	$S_k = \begin{bmatrix} S_{1,k} & S_{2,k} & \frac{S_{3,k}}{\sqrt{2}} \\ -S_{2,k}^* & S_{1,k}^* & \frac{S_{3,k}}{\sqrt{2}} \\ \frac{S_{3,k}^*}{\sqrt{2}} & \frac{S_{3,k}^*}{\sqrt{2}} & \frac{-S_{1,k} - S_{1,k}^* + S_{2,k} - S_{2,k}^*}{2} \\ \frac{S_{3,k}^*}{\sqrt{2}} & \frac{-S_{3,k}^*}{\sqrt{2}} & \frac{S_{2,k} + S_{2,k}^* + S_{1,k} - S_{1,k}^*}{2} \end{bmatrix}$

The specification indicates "[t]he rows of the signal transmission matrix represent the ***time*** dimension, the columns represent the ***space*** dimension and the index k represents the ***frequency*** dimension or the corresponding sub-carrier." ('782 Patent 11:47-50; '304 Patent 11:38-41.) But, while the specification provides examples of what a POSITA would understand to illustrate when a "signal transmission matrix" ***is*** a "space-time block code," it provides no guidance or "objective boundary" whatsoever for a POSITA to determine whether a particular "signal transmission matrix" ***resembles or does not resemble*** a "space-time block code." (Proctor ¶ 74.)

The problem with the use of the subject term "resemble" in the claims can be illustrated by way of a simple illustrative analogy. If a claim required "a widget having ***a square shape***," a POSITA would know that to avoid infringement of the claim, the widget could not have a shape that has the universally known qualities of a square (*i.e.*, four sides of equal length at right angles). For example, to avoid infringement, the widget could be designed to be in the shape of a rectangle (*i.e.*, four sides but are not equal), a rhombus (*i.e.*, four sides but no right angles), or a pentagon (*i.e.*, five sides with no right angles).

Claimed Square Shape	Rectangular Shape	Rhombus Shape	Pentagon
			

However, if the claim instead required "a widget having ***a shape that <u>resembled</u> a square***," and the specification gave no guidance or objective boundaries as to what non-square shapes nevertheless were considered to be close enough to "resemble" a square, a POSITA trying to avoid infringement would have no reasonable certainty whether widgets shaped like a rectangle, rhombus, or even a pentagon, were or were not covered by the claims.

Here, the claims require a "signal transmission matrix resembl[es/ing] an existing space-time block code." As an initial matter, "resemblance" is not a concept known to a POSITA for analyzing matrices or space-time codes. (Proctor Decl. ¶¶ 74-76.) For example, while a POSITA could determine whether a particular signal transmission matrix did or did not employ a space-time block code technique, a POSITA could not determine with reasonable certainly whether a technique that was not a space-time block code would nevertheless be considered to "resemble" a space-time block code. (Proctor Decl. ¶¶ 75-76.) Furthermore, since the specification of the Mody Patents provides no guidance or objective boundaries as to what signal transmission matrices that were not space time block codes nevertheless were considered to be close enough to "resemble" a space time block code, a POSITA trying to avoid infringement would have no reasonable certainty whether the design of a signal transmission matrix that was not a space time block code was or was not covered by the claim. (Proctor Decl. ¶¶ 75-76.) For example, given the lack of an objective baseline or standard to make the determination, one POSITA might subjectively consider that the signal transmission matrix in question was "close enough" to being a "space-time block code" that it "resembles" the space-time block code, while another POSITA could come to the exact opposite conclusion. (Proctor Decl. ¶¶ 75-76.)

The ambiguity of the scope of the claims is confirmed by AP's proposed construction that the claimed "signal transmission matrix resembl[es/ing] an existing space-time block code" should be construed as the "signal transmission matrix ***has/having qualities or features in common with*** a pre-defined space-time block code." But this so-called construction provides no objective boundary or baseline to a POSITA for determining the scope of the claims. (Proctor Decl. ¶¶ 77-78.) For example, even if a POSITA were aware of a universally agreed list of the "qualities or features" of a "space-time block code," which a POSITA would not, there is no guidance on which

and how many of these qualities or features would need to be present in the accused signal transmission matrix for it to "resemble" a space-time block code. (Proctor Decl. ¶ 79.) Furthermore, since the claims also require that the resemblance be with respect to an "existing"[8] space-time block code and the specification provides no guidance as to what space-time block codes are considered to be "existing," the scope of the claims is even more unclear. (Proctor Decl. ¶ 80.)

Since "the intrinsic and extrinsic evidence does not provide any 'objective baseline' to enable a POSITA to differentiate" between a mathematical concept that does "resemble" a space-time block code and one that does not, the claim terms are indefinite.

III. CONCLUSION

For the foregoing reasons, Xerox respectfully requests that the Court adopt its proposed constructions for the following terms.

Patent No. (Claim Nos.)	Disputer Term	Proposed Construction
'803 Patent (Claim 1)	"information"/"when no information is being received" (Claim 1)	No construction necessary
'782 Patent (Claims 1 & 30) '304 Patent (Claims 2 & 3) '458 Patent (Claim 20)	"Multi-Input, Multi-Output (MIMO) … system"	plain and ordinary meaning which is "a system having a receiver with multiple inputs and a transmitter with multiple outputs, wherein the multiple inputs of the receiver receive signals from the multiple outputs of the transmitter"

[8] AP attempts to substitute the term "pre-defined" with "existing" in its proposed construction. But such a substitution is not only unsupported, it injects further ambiguity into the scope of the claim since it is unclear what a "pre-defined" space-time block code is. (Proctor Decl. ¶ 80.)

Patent No. (Claim Nos.)	Disputer Term	Proposed Construction
'782 Patent (Claims 1 & 30) '458 Patent (Claims 1 & 20)	"synchroniz[e/ing] the [received/demodulated] frame [to/with the transmitted frame] … in [a/both/the] time domain and frequency domain"	Time synchronization: plain and ordinary meaning, which is "estimating the time of arrival of the transmitted signal/frame to determine the start time of the received frame" Frequency synchronization: plain and ordinary meaning, which is "correcting for the difference between the transmitter frequency and the receiver frequency"
'782 Patent (Claims 1, 6, 30, 38, 49) '482 Patent (Claim 4.)	"coarse time synchroniz[ing/ation]" and "fine time synchroniz[ing/ation]"	Indefinite (35 U.S.C. §112, ¶ 2)
'782 Patent (Claims 44 & 51) '304 Patent (Claim 7)	"signal transmission matrix resembl[es/ing] an existing space-time block code"	Indefinite (35 U.S.C. §112, ¶ 2)

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that a true and correct copy of the above and foregoing document has been served on all counsel of record via the Court's ECF system.

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